Assessment of rainfall forecasts based on Canonical Correlation Analysis of satellite Remote Sensing data

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MOTIVATION
- Global warming has modified the frequency and intensity of climate variables.
- IMERG products have achieved more than 20 years of precipitation data and provide global coverage. CHIRPS has more than 30 years of data. Both use satellite and gauge data.
- Modeling through Canonical Correlation Analysis (CCA) between rainfall gauges observations and Sea Surface Temperature (SST) is the most widely applied method to generate seasonal rainfall forecasts.

METHOD
- Global SST (Rayn_Smith Olv2)
- Rainfall (Set Y)
- Transform into EOFs
- Find the best CCA combination = Max corr
- Categorical forecast
- Quantitative forecast
- Deterministic forecast
- Model Validation
- Discussion & Conclusions

RESEARCH QUESTIONS
- How does the choice of satellite products influence the CCA model performance? (Final IMERG vs CHIRPS).
- Does the period length of satellite data affect the predictive skill of the CCA model? (IMERG starts in 2000, CHIRPS starts in 1979).
- How important are the corrections adjustment applied on satellite data? (Early IMERG vs Final IMERG).

What is Canonical Correlation Analysis?
CCA is a statistical method to find the best linear combination between two multivariate datasets with the strongest correlation between them.

Can you see the challenges?

The geographical location of 87 rain gauges with long-term quality data and rivers in Panama.

Challenging factors in predicting seasonal precipitation in Panama:
- An isthmus with narrow and elongated shape.
- Located in the tropics, between the Caribbean Sea and the Pacific Ocean.
- The Central Mountain Range divide the country in Atlantic and Pacific regions.
- Global-scale phenomena have a strong relationship with its climate variations.
- Presence of ungauged basins and heterogeneous distribution of precipitation.

Why Remote Sensing Data?
“Remote sensing is obtaining information from an object without touching it.”

1. More than 30 years of satellite-based precipitation data.
2. Continuous coverage with high spatial resolution.
3. Integration of surface precipitation gauges.


REFERENCES
2. Sierra-Lorenzo, E., et al. (2020). Assessment of different WRF Configurations performance for a RAIN event over Panama. Atmospheric and Climate Sciences, 10(03), 280-297.